

REMARKS

Claims 1, 3 and 11 have been amended, and claims 7-9 and 15-20 have been cancelled. Claims 1, 3, 4, 6, and 10-14 are, therefore, presently pending.

Claim 1 has been limited by the introduction of the subject matter of claim 9 with consequent cancellation of claims 7 to 9, and apparatus claims 15-20 have also been canceled. A typographical error has been corrected in claim 11 and claim 3 has been corrected to more properly refer to claim 1, as requested by the Examiner. No new matter has been introduced and the amendments do not require additional searching, serving only to distinguish over the prior art. Entry is therefore requested.

It will be noted that claim 1 specifically refers to photographic waste water. This limitation, by the insertion of claim 2, was made in response to the Amendment dated 25 February 1998, but was inadvertently omitted from the formal recital of claims in the Appellant's Brief dated 03 May 1999, although it was clear from that Brief that the claims were intended to be so limited, as in the recital of the Statement of Invention on page 1 thereof.

Rejection under 35U.S.C. 102

Claims 1, 3, 4, 6 and 11 have been rejected under 35 U.S.C. §102(b) as being clearly anticipated by DE 36 35 219 (A1), (Reißner). According to the full translation of that document it has now been established that there is a disclosure in that document of the use of a tube filled with carrier material, specifically (neutral) activated charcoal or aluminium oxide to which the metal is chemically bond or on which the metal compound is precipitated. The original premise on which the Examiner's objections were based, that Reißner did not disclose a solid substrate and on which the Appellant's arguments were based, is therefore acknowledged by the Applicant to be incorrect. The Applicant is appreciative of receiving the full translation of that document which clarifies the position.

Accordingly the Applicant has limited claim 1 and the corresponding independent claims to the substrate being specifically an anion exchange material, with basis from original claim 9. Since Reißner does not disclose the use of an anion exchange material, the Examiner has correctly not raised an objection under this

section to that claim, so that claim 1 as now amended is not anticipated thereby. Thus it is respectfully requested that the rejection under 35 U.S.C. §102(b) be withdrawn.

Rejections under 35 U.S.C 103 (a)

Claims 7 and 10 have been rejected under 35 U.S.C. §103(a) as unpatentable over Reißner. Since claim 9 is a claim to which his rejection is not applicable, its present incorporation into claim 1 clearly overcomes this obviousness rejection. It is respectfully requested that the objection under 35 U.S.C. 103(a) with regard to this reference be withdrawn.

Claims 8, 9 and 12-14 have been rejected as unpatentable under 35 U.S.C §103(a) as being unpatentable over Reißner in view of US Patent No. 5,552,063 in the name of Yan. Reißner differs from the present invention, in particular, in that it lacks the disclosure of an anionic exchange material. The Examiner has attempted to overcome the deficiency in Reißner by citing Yan, which shows the use of an ion exchange resin to immobilise a combination of transition metal catalysts in the treatment of industrial wastewater.

As indicated above, Reißner teaches the use of a carrier material on which the metal compound is *precipitated* or with which the metal compound is *chemically bonded*. Reißner considered, for example, (neutral) activated charcoal or aluminium oxide. Importantly, the examples in the present invention, catalyst ions were *adsorbed* on the *anionic* resin. For example, as described on page 7 of the present specification, molybdate ions were added to water in the form of a 1% solution of ammonium molybdate. Surprisingly, as shown by the comparisons in the Table on page 8, this was more effective than using peroxide and molybdate, without the anionic resin.

Yan cannot correct the clear and critical deficiencies of Reißner. According to established US case law, it is axiomatic that a combination of art must contain motivational teaching within itself to direct a skilled artisan to make that combination. It is respectfully submitted that there is no motivation to combine the disclosures of Yan and Reißner in the manner proposed by the Examiner, not least in that there is a clear *teaching away* in Yan from the use of (a) hydrogen peroxide and (b) a single metal in oxidised form as catalyst, as required by Reißner.

The following points of difference between Yan and the present invention and between Yan and Reißner are noted.

(a) Yan does not relate to photographic effluent.

The wastewater concerned contains phenol, cresol, ammonia and optionally sulfite and thiosulphate. Photographic effluent does not contain at least the first two of these components and the concerns faced by Yan to remove these is clearly inapplicable. The data in his examples is limited to the removal of phenol, cresol and ammonia.

(b) Yan teaches the use of air as an oxygen source.

According to Yan the source of oxygen is preferably air (col.8 lines 9-13), that ozone or molecular oxygen could also be used but that hydrogen peroxide 'is not contemplated to be intentionally added as a source of oxygen for this process' (col.8 lines 11-13 and also claim 7), a clear teaching teaches away from both Reißner and the present invention, for which the use of hydrogen peroxide or a compound that releases hydrogen peroxide is essential.

The reason for this statement in Yan is that hydrogen peroxide is known to decompose on a support, especially one with a large surface area. Moreover adsorption of a catalyst thereon would have led the skilled artisan to expect an increase in this decomposition of hydrogen peroxide. Yan clearly appreciated this fact in the above statement. Hence Yan's solution to the problem of using a support was appropriate for the use of air but was not contemplated in conjunction with the use of hydrogen peroxide. (Although it now transpires that Reißner did incidentally mention the possibility of the use of a support in combination with hydrogen peroxide, the clear teaching as supported by the single example was that the molybdate was added to the effluent). It was surprising therefore that hydrogen peroxide could be used with advantage in combination with, for example, molybdate ions, immobilised on an anionic exchange material.

(c) Yan discloses the use of a combination **only** of Group VIII and VI metals or metal compounds.

The catalyst is selected from the group of NiMo, NiW and CoMo on activated carbon (claim 1) and not their oxidised forms (see col. 5 lines 64 and 65), or sulfided catalysts. Yan states that the catalyst can be activated by reduction, **which** again leads away from the catalysts preferred in the present invention. Catalysts

containing copper, cobalt, molybdenum and tungsten alone on activated carbon are said to be ineffective (col.11 lines 25-26), a further clear teaching away. There is no disclosure that a catalyst such as a molybdate alone would be effective on a substrate.

(d) Yan requires an elevated temperature

The lowest temperature considered possible for the Yan process is 50°C (col.7 line 56) although the preferred range is 80°C-145°C.

(e) Yan requires the use of pressure

A pressure of 0-2000 psig is disclosed in Yan (col.7 line 55) but the preferred range and that present in claim 1 is 10 to 500 psig, i.e. for effective working of the invention both a raised temperature and pressure is required.

In the Applicant's specification, in contrast, the invention is limited to the use of hydrogen peroxide (or a compound capable of producing hydrogen peroxide) and specifically not air for treating photographic effluent (which does not contain cresol or phenol). Only the oxidised form of a single transition metal is within the scope of the Applicant's invention, namely the catalyst is selected from a molybdate, a tungstate, a chromate and a vanadate. The Applicant's invention may be carried out at room temperature and under atmospheric pressure.

Yan specifically contraindicates the use of hydrogen peroxide. Yan teaches a combination of a Group VIII and a Group VIA metal or compound, with a direct instruction that copper, cobalt, molybdenum and tungsten alone are ineffective for the purpose of that invention, as confirmed by the examples. Comparative examples 1-9 having a single metal on a support show negligible removal of phenol and cresol even at high temperatures (120°C) and pressures (35 psig). In contrast catalysts using CoMo and NiW in particular showed a very large removal of phenol and cresol, up to 99% of each in some cases.

The skilled man would not be led by the teaching in this document that unwanted species from photographic effluent, which do not contain cresol or phenol, could be treated by hydrogen peroxide, which is specifically contraindicated in Yan, by the use of the oxidised form of a single transition metal immobilized on a substrate, which is taught in Yan to be ineffective. Although the claims of Applicant's application are not so limited, nor would it have been predicted that Applicant's invention could be achieved so simply under conditions of ambient temperature and pressure.

The Examiner considers that the adjustment of pH by the addition of alkali in claims 12 -14 is within the ordinary skill of the skilled man. Since these claims depend on a claim which is submitted to have patentable merit, these claims serve merely to define preferred embodiments with the general ambit of claim 1.

It is submitted that the references cited by the Examiner alone or in combination do not teach or render obvious the present invention. In particular the Yan reference specifically teaches away from Reißner so the required motivation for the skilled addressee to consider these references in combination to achieve the environmental and economic advantages thereof is clearly lacking. Thus, it is respectfully requested that the objection under 35 U.S.C. 103(a), that the invention is unpatentable over Reißner in view of Yan, be withdrawn.

The Examiner has finally rejected claims 15-20 as being unpatentable over Yan. He states that the 'figures of Yan shown an apparatus for treating waste water comprising a tower unit (12) containing a supported catalyst (16), inlet line (10), and outlet line (19), which are structurally indistinguishable from the tank, receptacle, conduit apparatus, inlet and outer combinations recited in instant claims 15-20'.

With respect it the Applicant cannot find the depicted apparatus in Yan, the two figures being graphs showing ammonia and phenol removal (see also col. 4, lines 45-52). However this objection is moot since Applicant has deleted these claims.

In view of the foregoing remarks, reconsideration of this patent application is respectfully requested. A prompt and favorable action by the examiner is earnestly solicited.

Respectfully submitted



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